

## Failure Modes and Effects Analysis (FMEA) Assistant Tool

Completed Technology Project (2011 - 2013)



## Project Introduction

The FMEA Assistant tool offers a new and unique approach to assist hardware developers and safety analysts perform failure analysis by using model based systems engineering concepts. Users make several selections about their component's functions and inputs/outputs, then the tool recommends for consideration a list of potential failure modes based on a common failure modes list compiled over the course of several major human spaceflight programs. The FMEA Assistant Tool can help the hardware developer and safety analyst identify early opportunities to design out failure modes, thereby prevent the need for re-design, and can save cost and schedule.

The FMEA Assistant guides the analyst through a set of questions about component attributes, including subsystem type, kinds of resources used, and types of outputs. The chosen attributes narrow down the number of possible choices of failure modes that make sense for that component. The analyst need only consider a few small sets from the full list of common failure modes to find the appropriate ones. The dialog is dynamic, so that the choices of failure modes presented change if the analyst changes the attribute selections. The tool also has extended the use of standardization by offering short lists of common failure causes and effects for each failure mode. Two new features have recently been added: support for choosing hazards associated with identified failure modes and effects, and a library of standard components (e.g., valve, gauge, latch) with pre-selected failure modes.

## Anticipated Benefits

Improved prototype failure analysis software tool which could be used by Government Furnished Equipment (GFE) projects; payloads; Advanced Exploration System (AES) projects early in the design process. There are also potential benefits of use to other projects during the operations phase to identify the cause(s) of a fault or failure. We are developing a User's Guide and publicly releasable version of the prototype tool. We are also seeking potential users to offer a tool demonstration for preliminary evaluation.



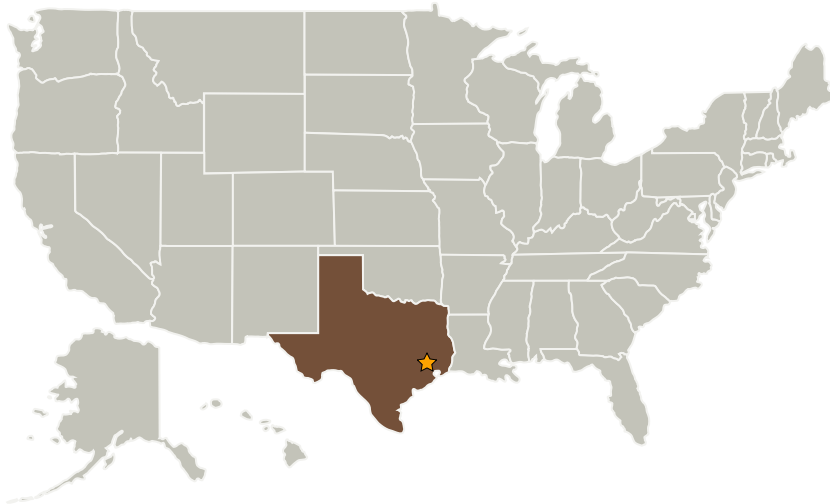
Project Image Failure Modes and Effects Analysis (FMEA) Assistant Tool

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Jacobs Engineering Group, Inc.	Supporting Organization	Industry	Dallas, Texas

### Primary U.S. Work Locations

Texas

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Johnson Space Center (JSC)

### Responsible Program:

Center Innovation Fund: JSC CIF

## Project Management

### Program Director:

Michael R Lapointe

### Program Manager:

Carlos H Westhelle

### Project Manager:

Melissa D Flores

### Principal Investigator:

Melissa D Flores

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## Images

**12103-1376674679539.jpg**

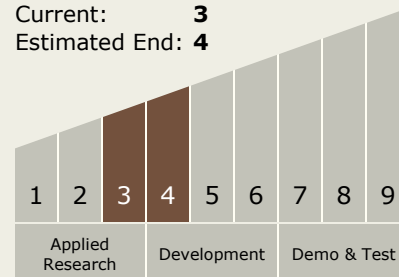
Project Image Failure Modes and Effects Analysis (FMEA) Assistant Tool  
(<https://techport.nasa.gov/image/2225>)

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Project Image Failure Modes and Effects Analysis (FMEA) Assistant Tool  
(<https://techport.nasa.gov/image/2226>)

## Technology Maturity (TRL)

Start: **3**  
Current: **3**  
Estimated End: **4**



## Technology Areas

## Primary:

- TX02 Flight Computing and Avionics
  - └ TX02.3 Avionics Tools, Models, and Analysis
    - └ TX02.3.3 Avionics Reliability and Fault-Tolerance Analysis and Modeling